REMARKS

The Official Action mailed February 14, 2008, has been received and its contents carefully noted. This response is filed within three months of the mailing date of the Official Action and therefore is believed to be timely without extension of time. Accordingly, the Applicant respectfully submits that this response is being timely filed.

The Applicant notes with appreciation the consideration of the Information Disclosure Statements filed on March 16, 2001; January 7, 2005; and March 23, 2006.

Claims 2-6 and 8-12 are pending in the present application, of which claims 2, 6 and 11 are independent. Claims 8-10 have been amended to depend from claim 6. For the reasons set forth in detail below, all claims are believed to be in condition for allowance. Favorable reconsideration is requested.

Paragraph 4 of the Official Action objects to claims 8-10 since they "depend on canceled claim 7" (page 2, Paper No. 20080212). In response, claims 8-10 have been amended to depend from claim 6. Accordingly, reconsideration and withdrawal of the objections are in order and respectfully requested.

Paragraph 5 of the Official Action rejects claims 2-6 and 8-12 as obvious based on the combination of U.S. Patent No. 6,081,228 to Leimer and U.S. Patent No. 5,572,516 to Miya. The Applicant respectfully traverses the rejection because the Official Action has not made a *prima facie* case of obviousness.

As stated in MPEP §§ 2142-2143.01, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some reason, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some reason to do so found either explicitly or implicitly in the references themselves or in the knowledge generally

available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

The prior art, either alone or in combination, does not teach or suggest all the features of the independent claims. Independent claims 2, 6 and 11 recite the following technical features of the present invention:

(i) The present invention is directed to a radio digital signal receiver for receiving a broadcast signal obtained by multiplexing a plurality of kinds of polyphase PSK-modulating signals having respective different numbers of phases.

(ii) The radio digital receiver operates in two reception modes, that is, a burst symbol reception mode and a continuation reception mode.

(iii) The burst symbol reception mode allows a carrier to be regenerated from only a polyphase PSK modulating signal having the minimum number of phases of the received plurality of kinds of polyphase PSK-modulating signals, and the continuation reception mode allows a carrier to be regenerated one by another from respective ones of the received plurality of kinds of polyphase PSK-modulating signals.

(iv) Inherent phase noise characteristics of a local oscillator in an outdoor unit are estimated.

(v) A carrier regenerative loop characteristic is selected and switched so that a critical CNR by a phase noise has either a rapid variation property or a gentle variation property, on the basis of the quality of the estimated inherent phase noise characteristics.

(vi) After selecting and switching the carrier regenerative loop characteristic, the operation of the receiver is shifted from the burst symbol reception mode to the continuation reception mode.

For the reasons provided below, Leimer and Miya, either alone or in combination, do not teach or suggest the above-referenced features of the present invention.

As to technical feature (i), the receiver of the present invention receives a broadcast signal obtained by multiplexing a plurality of kinds of poly phase PSK-modulating signals (e.g. a BPSK-modulating signal, a QPSK-modulating signal and 8PSK-modulating signal).

Leimer and Miya do not teach or suggest receiving a signal obtained by multiplexing a plurality of kinds of polyphase PSK-modulating (such as a BPSK-modulating signal, a QPSK-modulating signal and an 8PSK-modulating signal).

As to technical features (ii), (iii) and (vi), Leimer and Miya do not teach or suggest using two reception modes, that is, a burst symbol reception mode and a continuation reception mode.

As to technical feature (iv), for the reasons provided below, Leimer and Miya do not teach or suggest phase noise characteristics of a local oscillator in an outdoor unit.

The present invention is particularly unique in estimating inherent phase-noise characteristics of a local oscillator contained in a down-converter in an outdoor unit (i.e., an antenna plus a down converter) on the basis of the measured bit error rate (BER) when the measured CNR has a specific value.

The technical idea of the present invention is based on the discovery of the phenomenon that the relationship between the reception CNR and the BER of the digital signal (when burst waves are received) varies depending on the inherent phase noise characteristic of the local oscillator in the outdoor unit. The present invention properly estimates the inherent phase-noise characteristic of the local oscillator in the outdoor unit on the basis of (i) the known relationship (i.e., foresight information), which has been measured beforehand, among the reception CNR, the BER and the inherent phase-noise level of the local oscillators, and (ii) the CNR and the BER which are actually observed when operating the receiver.

According to the present invention, even if it is difficult to directly measure the inherent phase-noise characteristic of the local oscillator, the inherent phase-noise characteristic of the local oscillator can be estimated in practically permissible accuracy on the basis of the detection of both the CNR and the BER upon reception. Therefore, it is possible to automatically establish the carrier regenerative loop characteristic suitable to the property of the outdoor unit connected to the receiver.

The above unique features of the present invention are not taught or suggested by Leimer and Miya, either alone or in combination.

Indeed, the receiver of Leimer appears to comprise a "Common Mode Phase Estimator" to estimate the phase noise. However, in Leimer, the estimate of the phase noise is made by tracing the phase of the received signal, which is essentially different from the estimating technique of the present invention (which does not use the received signal at all). Moreover, the present invention adopts an arrangement in which the carrier regenerative loop characteristic is changed, whereas Leimer appears to remove the useless phase noise. Thus, there are several essential distinctions between the present invention and the Leimer invention.

As to the technical feature (v), in the present invention, the carrier regenerative loop characteristic is set at either a critical CNR by a phase noise (e.g., graph "a" shown at Figure 5) having a rapid variation property or a critical CNR by a phase noise (e.g., graph "c" shown in Figure 5) having a gentle variation property. Here, it is to be noted that the critical CNR by a phase noise is a peculiar physical measure which is defined at in the present as follows: "Note that what is meant by the critical CNR as shown in Figure 5 and Figure 6 is the critical value where the error rate after a trellis code is decoded is 2×10^{-4} and which, after the Reed-Solomon is decoded, becomes error-free" (page 6, lines 1-4; emphasis added).

Indeed, in Leimer, several graphs for phase noise intensity, RMS phase error and C/N_0 are shown in Figures 2 to 7. However, these graphs are not relevant to the

"critical CNR by a phase noise" as presently claimed and defined in the present specification.

It is noted that a "critical CNR by a phase noise" is a particular physical measure. The specification of Leimer does not include descriptions of a physical measure corresponding to the claimed "critical CNR by a phase noise." Also, the Applicant respectfully submits that Leimer does not teach or suggest that a "critical CNR by a phase noise" is used.

Also, the Official Action asserts that "[t]he claimed 'rapid variation' and the 'gentle variation property' are not defined in the claim" (page 3, Paper No. 20080212). The Applicant respectfully disagrees and traverses the assertions in the Official Action. Claims 2, 6 and 11 clearly recite these features. For example, claim 2 recites the following: "means for selecting and switching a carrier regenerative loop characteristic on the basis of the quality of the estimated inherent phase noise characteristics of the local oscillator in the outdoor unit, wherein the means for selecting and switching a carrier regenerative loop characteristic operates so that (i) if it is decided by the decision means that the phase noise characteristics are higher quality, a carrier regenerative loop characteristic corresponding to a critical CNR by a phase noise having a rapid variation property is selected and (ii) if it is decided by the decision means that the phase noise characteristics are lower quality, a carrier regenerative loop characteristic corresponding to a critical CNR by a phase noise having a gentle variation property is selected."

Moreover, in the present invention, it is detected whether a received CNR exceeds a first predetermined threshold value (e.g., 15dB), and when the received CNR exceeds the first predetermined threshold value, the bit error rate (BER) is further detected. Thus, it is decided whether a value of the BER (when the measured CNR exceeds the first predetermined) is more or less than a second predetermined threshold value (e.g., 5.5×10^{-3}), and on the basis of this decision result for the BER, it is further estimated and decided whether the phase noise characteristics of the local oscillator

contained in the down-converter are higher quality or lower quality. Also, if the phase noise characteristics of the local oscillator are decided to be higher quality, then a carrier regenerative loop characteristic is set at a characteristic "a" (shown in Figure 5), and otherwise the carrier regenerative loop characteristic is set at a characteristic "b" or "c" (shown in Figure 5).

In one preferable embodiment of the present invention, the relationship between the bit error rate and the carrier regenerative loop characteristic is as follows:

Bit Error Rate	Carrier Regenerative Loop Characteristic
6.8×10^{-3}~	c
$5.5 \times 10^{-3} \sim 6.8 \times 10^{-3}$	b
$4.5 \times 10^{-3} \sim 5.5 \times 10^{-3}$	a
~ 4.5×10^{-3}	a

These features, which were previously incorporated into each of independent claims 2, 6 and 11, are not taught or suggested by the alleged combination of Leimer and Miya.

Therefore, the Applicant respectfully submits that Leimer and Miya, either alone or in combination, do not teach or suggest features (i) through (vi).

Since Leimer and Miya do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are in order and respectfully requested.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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